

DEDICATION

This thesis was completed with the unwavering support of my family. I give thanks to GOD and express my gratitude to everyone who has provided guidance, assistance, and encouragement throughout this journey.

I dedicate this work to my beloved parents, Ruzhar S Fadhil and Armien Puspa Murni and also my beloved wife Sofyana Hambali and our children Kyona Shavia and Gemael Ashabb.

Lastly, this thesis is also dedicated to all informatics students worldwide, with the hope that this research will offer a meaningful contribution to the field of Computer Science.